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THE CONSTITUENTS OF THE RHIZOME OF IRIS VERSICOLOR.

By Frederick B. Power and Arthur H. Salway.

A Contribution from the Wellcome Chemical Research Laboratories, London.

The rhizome and roots of *Iris versicolor,* Linné (Nat. ord. *Iridaceæ*), commonly known as the "Larger Blue Flag," were recognized for several decades by the Pharmacopœia of the United States (Revisions of 1870, 1880 and 1890) under the official title of *Iris,* together with liquid and solid extracts prepared therefrom. In the eighth revision (1900), however, of the above-mentioned work the drug was deleted, probably on account of its limited use or the variability and uncertainty of its action. Under the names of "Irisin" or "Iridin" preparations have been introduced, and are still somewhat employed medicinally, which consist either of the resin or of an ethereal or alcoholic extract of the drug.

Although in the literature[1] it has been recorded that the rhizome of *Iris versicolor* contains starch, gum, tannin, sugar, an acid resin, and fatty oil, together with some volatile matter and possibly an alkaloid, its constituents have never been thoroughly investigated. As the rhizome, at least in the fresh state, evidently possesses considerable potency, acting as a cathartic and emetic, although its medicinal activity is stated to become impaired by age, it was deemed desirable to subject it to a complete chemical examination.

EXPERIMENTAL.

The material employed for the present investigation consisted of commercial "Blue Flag Root," the identity of which was established, and it appeared to be of good quality.

As a preliminary experiment, a small portion of the ground

[1] This *Journal,* 1876, **48,** p. 406; 1881, **53,** p. 601; 1884, **56,** p. 616.

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material was tested for the presence of an alkaloid, but with a negative result. A further quantity (25 grammes) of the ground material was successively extracted in a Soxhlet apparatus with various solvents, when the following amounts of extract, dried at 100°, were obtained:

Petroleum (b. p. 35–50°)	extracted	0.30 Gm.	=	1.2 per cent.
Ether	"	0.80 "	=	3.2 " "
Chloroform	"	0.22 "	=	0.9 " "
Ethyl acetate	"	0.42 "	=	1.7 " "
Alcohol	"	4.13 "	=	16.5 " "
	Total	5.87 Gm.	=	23.5 per cent.

For the purpose of a complete examination 62.82 kilogrammes of the ground material were extracted by continuous percolation with hot alcohol. After removing the greater portion of the alcohol, there remained a viscid, dark-colored extract, amounting to 15.72 kilogrammes.

Distillation of the Extract with Steam. Separation of an Essential Oil.

Two kilogrammes of the above-mentioned alcoholic extract were mixed with a little water, and subjected to distillation in a current of steam for several hours. The distillate contained a small quantity of oil floating on the surface, which was extracted with ether. The ethereal liquid was dried, and the solvent removed, when there remained 2 grammes of an *essential oil,* this amount corresponding to 0.025 per cent. of the weight of the drug. The essential oil possessed a yellow color, a strong, somewhat unpleasant odor, and contained traces of furfuraldehyde, as indicated by the aniline color test. Its density was 0.9410 at 20°/20°; when examined polarimetrically, no appreciable optical rotation could be observed.

Non-volatile Constituents of the Extract.

After removal of the essential oil, as above described, there remained in the distillation flask a deep brown, aqueous liquid (A) and a brown resin (B). These were separated by filtration, and the resin well washed with water, the washings being added to the main portion of the aqueous liquid.

Examination of the Aqueous Liquid (A).

The aqueous liquid was concentrated to a convenient volume under diminished pressure, and then repeatedly extracted with ether, the ethereal extracts being united, washed with a little water, and dried with anhydrous sodium sulphate. On removing the solvent, 15 grammes of an oily residue were obtained, which did not solidify on keeping. For the further examination of this product it was redissolved in ether, and the ethereal liquid shaken successively with solutions of ammonium carbonate (*a*), sodium carbonate (*b*), and sodium hydroxide (*c*).

Isolation of iso*Phthalic Acid,* $C_6H_4(CO_2H)_2$.

The ammonium carbonate extract (*a*) of the above-mentioned, ethereal liquid was acidified with dilute sulphuric acid, when an oil was precipitated which was taken up by ether. This ethereal solution was then washed, dried, and the solvent removed, when 10.5 grammes of a brown, viscid oil remained. The latter was next heated with methyl alcohol in a current of dry hydrochloric acid gas, and thus converted into its methyl ester, which, by treatment with dilute, aqueous sodium hydroxide could be separated into phenolic and non-phenolic portions. The portion insoluble in alkali, comprising the non-phenolic esters, amounted to 7 grammes. It distilled at 140–260°/20 mm., the greater portion, however, passing over at 150–180°/20 mm. This ester was then converted into the corresponding acid by heating for a short time with alcoholic potassium hydroxide. After hydrolysis was complete, the alcohol was removed, and the alkaline liquid acidified with dilute sulphuric acid, when a semi-solid, oily product was precipitated. The latter was removed by filtration, dried on a porous tile, and purified by crystallization from dilute alcohol. It was thus obtained in colorless, glistening leaflets, which did not melt below 300°.

0.0919 required for neutralization 10.85 c.c. $\frac{N}{10}$ $Ba(OH)_2$.

Neutralization value = 66.2

$C_6H_4(CO_2H)_2$ requires Neutralization value = 66.8

The crystalline acid, above described, was only sparingly soluble in hot water, but readily soluble in alcohol. When heated strongly in an ignition tube, it sublimed, forming colorless prisms on the cooler portions of the tube. Its barium salt was readily soluble in

water. These properties, together with the result of its titration, as given above, indicated it to be *iso*phthalic acid. In order to confirm its identity, a portion of the substance was heated with phosphorus pentachloride in the presence of benzene, and the product vigorously agitated with concentrated ammonia. In this manner an acid amide was formed, which was collected and well washed with water. The latter compound sintered at 260° and melted completely at 275°. A known specimen of *iso*phthalic acid, when similarly treated, also yielded an acid amide sintering at 260° and melting at 275°, and when the two specimens of amide were mixed the melting point remained unaltered.

The above-described substance was thus identified as *iso*phthalic acid, the occurrence of which in nature does not appear to have been hitherto observed. The amount of this acid obtained from 2 kilogrammes of the alcoholic extract of "Blue Flag Root" was about 0.15 gramme, thus corresponding to 0.0019 per cent. of the weight of the drug.

The phenolic methyl esters, which had been separated from the non-phenolic portion by means of sodium hydroxide, as above described, were hydrolyzed by heating for a short time with an aqueous solution of this alkali. The liquid was then acidified, when a resinous precipitate was deposited, which was extracted with ether. The ethereal liquid was washed and dried, and, on removing the solvent, yielded about 1 gramme of a brown oil. Since the latter did not show any indication of crystallizing, it was agitated with light petroleum, the petroleum extract decanted from insoluble oil, and the solvent allowed to evaporate. A trace of a crystalline solid was thus obtained, which gave a violet coloration with ferric chloride as well as the characteristic odor of oil of wintergreen when heated with methyl alcohol and a few drops of concentrated sulphuric acid. The presence of salicylic acid was thus indicated, but the amount was too small to admit of complete identification. That portion of the oil which was insoluble in light petroleum was again converted into its methyl ester, and the latter benzoylated by the Schotten-Baumann method. The product was oily, but gradually deposited a few colorless crystals. These were separated from adhering oil by spreading them on a porous tile, and then recrystallized from alcohol, when they separated in stellar aggregates of fine needles, melting

at 110°. The amount of this substance was too small for further examination.

The sodium carbonate (*b*) and the sodium hydroxide (*c*) extracts of the original ethereal liquid, when acidified, yielded only small quantities of gummy substances from which no definite compound could be isolated. On finally evaporating the ethereal liquids, which had thus been completely extracted with alkalies, 1.5 grammes of a yellow, amorphous mass remained.

The original aqueous liquid (A), which had been extracted with ether as above described, was next repeatedly shaken with amyl alcohol. The united amyl alcoholic extracts were washed with water, and then extracted successively with aqueous solutions of ammonium carbonate, sodium carbonate, and sodium hydroxide. The ammonium carbonate extract, when acidified with dilute sulphuric acid, yielded a resinous precipitate, which was taken up by amyl alcohol, the solution being washed, dried, and the solvent removed. The brown syrup thus obtained, which showed no tendency to crystallize, gave an intense black coloration with ferric chloride, and evidently contained tannin. For the further examination of this syrup it was esterified, but no definite substance could be isolated by this treatment.

The sodium carbonate and sodium hydroxide extracts of the amyl alcoholic liquid yielded only small quantities of brown, amorphous resins, which were specially examined for glucosides, but no positive evidence of the presence of such compounds was afforded. The amyl alcoholic liquid, which had been extracted with the various alkalies, was finally washed, and the solvent removed under diminished pressure. A thick, gummy mass, amounting to about 2 grammes, was thus obtained, but no crystalline compound could be isolated from it.

The aqueous liquid which had been extracted with ether and with amyl alcohol, as above described, was dark brown in color, and gave a copious brown precipitate on the addition of a slight excess of basic lead acetate. The lead precipitate was collected, thoroughly washed, then suspended in water, and decomposed by hydrogen sulphide. After removing the lead sulphide by filtration, the filtrate was concentrated under diminished pressure to a small volume. The concentrated liquid was light yellow, gave a faint brown coloration with ferric chloride, and, after standing for some

time, deposited a brown, amorphous solid, but nothing crystalline was obtained from it.

The filtrate from the basic lead acetate precipitate, after removal of the excess of lead, gave a slight precipitate with potassium mercuric iodide, and when heated with potassium hydroxide a strong ammoniacal odor was developed, thus indicating the probable presence of soluble protein products. It readily reduced Fehling's solution, and contained a large amount of sugar, which yielded *d*-phenylglucosazone, melting and decomposing at 212°. It also contained some potassium salts, since the addition of an aqueous solution of picric acid to a portion of the liquid caused a gradual separation of crystals of potassium picrate. The main portion of the aqueous liquid was concentrated to the consistency of a syrup and kept for a considerable time, but nothing crystalline was deposited.

The Resins (B).

The resinous material which had been separated from the original alcoholic extract, as previously described, was a dark-colored, soft solid, and amounted to 694 grammes, thus representing about 8.7 per cent. of the weight of the drug. It was digested with hot alcohol, the liquid brought on to purified sawdust, and the thoroughly dried mixture then extracted successively in a large Soxhlet apparatus with various solvents. The amounts of the respective extracts, dried at 100°, were as follows:

Petroleum (b. p. 35–50°)	extracted	296.0 Gms.	= 42.6	per cent.
Ether	"	226.0 "	= 32.6	" "
Chloroform	"	38.2 "	= 5.5	" "
Ethyl acetate	"	16.4 "	= 2.4	" "
Alcohol	"	30.2 "	= 4.4	" "
		Total 606.8 Gms.	= 87.5	per cent.

From these results it would appear that a portion of the resin had been rendered insoluble during the process of extraction.

Petroleum Extract of the Resin.

The petroleum extract of the resin consisted of a dark-colored, oily product, and amounted to 296 grammes. It was dissolved in a large volume of ether, and the ethereal liquid shaken with aqueous

ammonium carbonate, which, however, removed only traces of gummy matter. An attempt subsequently to extract the ethereal liquid with aqueous sodium hydroxide resulted in the formation of an emulsion, which did not separate after several days. The ether was therefore completely removed from the mixture, and the residue hydrolyzed by heating for an hour with an excess of alcoholic potassium hydroxide. After removing the greater portion of the alcohol, water was added, and the alkaline mixture shaken repeatedly with ether. These ethereal extracts were united, washed, dried, and the solvent removed, when a yellowish-brown, semi-solid mass was obtained. This amounted to 35 grammes, and represented the unsaponifiable portion of the petroleum extract of the resin.

Isolation of a Phytosterol, $C_{27}H_{46}O$, *Myricyl Alcohol,* $C_{31}H_{64}O$, *and Heptacosane,* $C_{27}H_{56}$.

The above-described, brown, semi-solid mass was dissolved in a mixture of alcohol and ethyl acetate, and subjected to a process of fractional crystallization. The more soluble fraction ultimately yielded a crystalline substance, which separated from alcohol in colorless needles. This substance, when air-dried, melted at 133°, but, when dried at 100°, it lost water of crystallization, and then melted at 148°.

0.1714, when heated at 110°, lost 0.0076 H_2O. $H_2O = 4.4$

0.1052, dried at 110°, gave 0.3236 CO_2 and 0.1144 H_2O.

$C = 83.9$; $H = 12.1$

$C_{27}H_{46}O,H_2O$ requires $H_2O = 4.5$ per cent.

$C_{27}H_{46}O$ requires $C = 83.9$; $H = 11.9$ per cent.

The above-described substance has thus been shown to agree in composition with a phytosterol of the formula $C_{27}H_{46}O$, and it yielded the color reactions of that class of compounds. Its optical rotatory power was determined with the following result:

0.1638 of anhydrous substance, made up to 25 c.c. with chloroform, gave $a_D - 0° 28'$ in a 2 dcm. tube, whence $[a]_D - 35.6°$.

The more sparingly soluble crystalline deposits obtained by the above-mentioned fractionation melted indefinitely over a considerable range of temperature, namely from 63 to 77°, and apparently consisted of a mixture of a hydrocarbon and a fatty alcohol. They were therefore heated for an hour at 130° with an equal weight of phthalic anhydride in the presence of xylene. The product of the reaction was then dissolved in a mixture of ether and chloroform,

and the solution shaken with aqueous sodium carbonate, when the sodium salt of an acid phthalic ester was immediately deposited. The latter was collected, and washed with a mixture of ether and chloroform, and then hydrolyzed by heating with alcoholic sodium hydroxide. After removing the alcohol from the reaction product, water was added, and the fatty alcohol thus precipitated was collected and crystallized from ethyl acetate, when minute, colorless needles, melting at 84°, were obtained. This substance was analyzed with the following result:

0.0913 gave 0.2742 CO_2 and 0.1154 H_2O. C = 81.9; H = 14.1

$C_{31}H_{64}O$ requires C = 82.3; H = 14.2 per cent.

The compound was thus identified as myricyl alcohol.

The ethyl acetate mother-liquors, remaining after the separation of the myricyl alcohol, yielded a small quantity of a crystalline substance melting at 77–78°. The melting point of this compound, together with the method of its isolation, would indicate that it consisted of ceryl alcohol, but the amount of substance was too small for an analysis.

The ether-chloroform solution which had been shaken with aqueous sodium carbonate to remove the myricyl acid phthalate, as above described, was evaporated, and the residue heated with alcoholic sodium hydroxide to remove the excess of phthalic anhydride. After evaporating the alcohol, and adding water to the residue, a small quantity of a solid was obtained, which was collected and recrystallized from ethyl acetate. It separated from this solvent in small, colorless leaflets, melting at 64–66°.

0.0931 gave 0.2903 CO_2 and 0.1230 H_2O. C = 85.0; H = 14.7

$C_{27}H_{56}$ requires C = 85.3; H = 14.7 per cent.

It is evident from the analysis and the melting point determination of this substance that it was heptacosane.

Isolation of Ipuranol, $C_{23}H_{38}O_2(OH)_2$.

The alkaline liquid obtained by the hydrolysis of the petroleum extract of the resin, having been extracted with ether to remove unsaponifiable material, as above described, was next acidified with dilute sulphuric acid, when the fatty acids were precipitated as a dark-colored oil. The mixture was then shaken with ether, which dissolved the fatty acids, leaving, however, a small quantity (0.7 gramme) of a green solid undissolved. The latter was collected, washed with hot alcohol, and recrystallized from pyridine containing

a little alcohol. It separated from this solvent in stellar aggregates of small, colorless needles, which decomposed at 285–295°.

0.0648 gave 0.1718 CO_2 and 0.0600 H_2O. C = 72.3; H = 10.3

$C_{23}H_{40}O_4$ requires C = 72.6; H = 10.5 per cent.

This compound, when dissolved in chloroform with a little acetic anhydride, and a drop of concentrated sulphuric acid subsequently added, gave a transient pink coloration, rapidly changing to blue and green. It yielded an acetyl derivative, which crystallized in colorless leaflets melting at 162–163°, and when this was mixed with a known specimen of diacetylipuranol the melting point remained unaltered.

The above-described compound was thus definitely identified as ipuranol (compare this *Journal*, 1908, **80**, pp. 264, 576; *Journ. Chem. Soc.*, 1908, **93**, p. 907; 1909, **95**, p. 249; 1910, **97**, pp. 7, 1102; *Pharm. Journ.*, 1910, **84**, p. 327).

Examination of the Fatty Acids.

The ethereal solution of fatty acids, from which the ipuranol had been separated, was washed with water, dried with anhydrous sodium sulphate, and the solvent removed. The residue, amounting to about 210 grammes, was dissolved in absolute ethyl alcohol, and esterified by passing a current of dry hydrochloric acid gas into the boiling solution. The excess of alcohol was then evaporated, the residual oil taken up by ether, and the ethereal solution washed, first with aqueous sodium hydroxide, which extracted a quantity of resinous substance, and then with water until free from alkali. After drying the solution, and removing the ether, the residual ethyl ester was fractionally distilled under diminished pressure, when 5 fractions were ultimately obtained, possessing the following constants:

Fraction	B. p.	Saponification Value	Iodine Value
1.	140–155°/$_{20mm.}$	249	2.5
2.	155–175°/$_{20mm.}$	242	4.7
3.	175–195°/$_{20mm.}$	224	15.3
4.	195–225°/$_{20mm.}$	189	51.7
5.	above 225°/$_{20mm.}$	...	...

Fraction 1.—This fraction, amounting to 12 grammes, distilled under atmospheric pressure at 260–270°. It possessed a fruity odor, and, from a consideration of its boiling point and saponification

value, appeared to consist chiefly of ethyl laurate (b. p. 269°; saponification value 246). In order to confirm the presence of lauric acid, the entire fraction was hydrolyzed with alcoholic potassium hydroxide, and the mixture then acidified and distilled in a current of steam. A quantity of volatile fatty acid was thus obtained, which melted at 40°, and was further identified as lauric acid by means of its neutralization value.

0.3150 required for neutralization 15.7 c.c. $\frac{N}{2}$ $Ba(OH)_2$.

Neutralization value = 280.

$C_{12}H_{24}O_2$ requires Neutralization value = 280.

Fractions 2 and 3.—These fractions, which were small in amount, were united and hydrolyzed with alcoholic potassium hydroxide, in order to obtain the free fatty acids. The latter were then dissolved in hot alcohol, and separated into four different fractions by the successive addition of small quantities of concentrated aqueous barium acetate. These fractions of barium salt yielded acids which melted at 33–35°, 33–35°, 35–36°, and 39°, and whose neutralization values were 260, 261, 268, and 275 respectively. It was evident from these results that fractions 2 and 3 consisted of a mixture of lauric acid (neutralization value = 280) and the acids of higher carbon content contained in the succeeding fraction.

Fraction 4.—This fraction contained the greater portion of the total fatty acids, and amounted to 120 grammes. Its iodine value (51.7) indicated the presence of a considerable quantity of unsaturated acid. For its further examination the acids were regenerated by hydrolysis, and then fractionally precipitated in hot alcoholic solution with small portions of concentrated aqueous barium acetate. In this manner the saturated acids were precipitated in the first 4 fractions, while the final fraction, which was oily, contained the unsaturated acids, and was therefore put aside for subsequent examination, as described below. The barium salts of the saturated acids thus obtained were treated separately with dilute hydrochloric acid, and the liberated fatty acids recrystallized from alcohol. The several fractions were then found to melt at 54–56°, 54–56°, 54–55°, and 53–55° respectively, while the corresponding neutralization values were 209, 212.5, 216, and 217. It was evident from these results that the saturated acids contained in fraction 4 consisted of a mixture of stearic and palmitic acids, whose neutralization values are 198 and 219 respectively.

The unsaturated acids, which were regenerated from the above-mentioned oily barium salt, still contained small quantities of saturated acids. The mixture was therefore converted into its lead salt, and the latter treated with cold ether. The portion insoluble in ether was found upon examination to consist of the lead salts of lauric and palmitic acids. The portion soluble in ether, when treated with dilute hydrochloric acid, yielded the unsaturated acids as a pale yellow oil, which possessed the following constants: neutralization value = 208; iodine value = 111.

In order to ascertain the constituents of the unsaturated acids, 12 grammes of the mixture were oxidized with dilute alkaline permanganate, as described by Lewkowitsch (*Chemical Technology and Analysis of Oils, Fats, and Waxes*, 1904, vol. i, p. 360), when the chief oxidation product was dihydroxystearic acid, melting at 128°.

0.3412 required for neutralization 10.95 c.c. $\frac{N}{10}$ KOH.

Neutralization value = 180.

$C_{18}H_{36}O_4$ requires Neutralization value = 178.

A small quantity of tetrahydroxystearic acid (sativic acid), melting at 156°, was also isolated.

0.3164 required for neutralization 9.1 c.c. $\frac{N}{10}$ KOH.

Neutralization value = 164.

$C_{18}H_{36}O_6$ requires Neutralization value = 164.

No linusic or *iso*linusic acid was present in the product of oxidation, and it may therefore be concluded that the unsaturated acids consisted of a mixture of oleic and linolic acids, the former predominating.

Isolation of Cerotic Acid, $C_{26}H_{52}O_2$.

Fraction 5.—The final fraction obtained by the distillation of the esters of the total fatty acids solidified in the receiver as a colorless solid. It was recrystallized several times from alcohol, when it separated in glistening leaflets, melting at 55–56°. This ester was then hydrolyzed, and the liberated fatty acid recrystallized from ethyl acetate. It was deposited from this solvent in colorless leaflets, melting at 78°, and was identified as cerotic acid.

0.1110 gave 0.3185 CO_2 and 0.1295 H_2O. C = 78.3; H = 13.0

0.1822 required for neutralization 4.75 c.c. $\frac{N}{10}$ KOH.

Neutralization value = 146.

$C_{26}H_{52}O_2$ requires C = 78.8; H = 13.1 per cent. Neutralization value = 142.

Ethereal Extract of the Resin.

This was a hard, black, brittle mass, and amounted to 226 grammes. It was digested with a large volume of ether, when a small portion of the resin (2 grammes) was found to be sparingly soluble in that solvent. The ethereal liquid was therefore filtered, and the undissolved portion separately examined. It was found to consist of ipuranol, $C_{23}H_{40}O_4$, which was identified by means of its diacetyl derivative, melting at 161–162°. This substance had already been isolated from the petroleum extract of the resin.

The ethereal liquid, from which the ipuranol had been removed by filtration, was then successively extracted with aqueous solutions of ammonium carbonate, sodium carbonate, and sodium hydroxide respectively. The ammonium carbonate and sodium carbonate solutions extracted only small quantities of amorphous, brown resins, from which no definite compound was isolated. The aqueous sodium hydroxide, on the other hand, extracted practically the whole of the resin as a thick, black liquid, a small quantity of the alkali being sufficient to extract a comparatively large amount of the resin, thus indicating that the latter possesses a very high molecular weight. On acidifying the alkaline extract, a brown, amorphous solid was precipitated, which was readily soluble in ether and alcohol. All attempts to isolate a crystalline compound from it were, however, unsuccessful. In order to ascertain whether the resin was glucosidic in character, a portion of it was heated for some time in alcoholic solution with dilute aqueous sulphuric acid. On removing the alcohol in a current of steam a quantity of resinous matter separated, which was collected and examined, but it yielded nothing crystalline. The aqueous liquid, after being freed from sulphuric acid by means of baryta was concentrated and tested for the presence of sugar, but with a negative result. The portion of resin extracted by ether is therefore non-glucosidic.

The ethereal liquid which had been shaken with alkalies, as above described, was washed, dried, and the solvent removed, when a small quantity of a thick oil was obtained. This was found to be similar in character to the petroleum extract of the resin, which had already been exhaustively examined.

Chloroform, Ethyl Acetate, and Alcohol Extracts of the Resin.

These were all black, brittle resins, and were small in amount. They were each carefully examined, but nothing of a crystalline

character could be isolated from them. Both the ethyl acetate and alcohol extracts of the resin were specially tested for the presence of a glucoside, but with a negative result.

SUMMARY AND PHYSIOLOGICAL TESTS.

The results of the present investigation of "Blue Flag Root" (the rhizome and roots of *Iris versicolor,* Linné), together with some physiological tests and the deductions therefrom, may be summarized as follows:

The material employed was the commercial drug, the genuineness of which was established, and it appeared to be of good quality. A preliminary test with a small portion of the material showed the absence of an alkaloid, and in the course of the investigation no evidence was obtained of the presence of a glucoside.

An alcoholic extract of the ground material, when distilled with steam, yielded a small amount of an essential oil, which possessed a yellow color, a strong, rather unpleasant odor, and had a density of 0.9410 at 20°/20°.

The portion of the extract which was soluble in water contained a little *iso*phthalic acid, $C_6H_4(CO_2H)_2$, which has not previously been observed to occur in nature, and apparently a trace of salicylic acid, together with tannin, and a sugar which yielded *d*-phenylglucosazone (m. p. 212°).

The portion of the extract which was insoluble in water consisted chiefly of a dark colored, soft resin, amounting to about 8.7 per cent. of the weight of the drug. From this resin the following definite products were isolated: A phytosterol, $C_{27}H_{46}O,H_2O$ (m. p. when anhydrous, 148°; $[a]_D$ — 35.6°); myricyl alcohol, $C_{31}H_{64}O$; heptacosane, $C_{27}H_{56}$; ipuranol, $C_{23}H_{38}O_2(OH)_2$; and a mixture of fatty acids, consisting of lauric, palmitic, stearic, cerotic, oleic, and linolic acids.

As no definite substance had been isolated in the course of this investigation to which the reputed properties of "Blue Flag Root" could be attributed, the following crude products therefrom were kindly tested for us by Dr. H. H. Dale, Director of the Wellcome Physiological Research Laboratories, to whom we desire here to express our thanks:

I. The total alcoholic extract.

II. The total resinous material.

III. The portion of the alcoholic extract which was soluble in water.

IV. An aqueous extract of the drug, prepared without heat.

Each of these preparations was given to a dog by the mouth, Nos. I and II in amounts of 1 gramme, and III and IV in considerable quantity. No vomiting or modification of the fæces was produced, nor could any other sign of activity be detected.

Although the potency of "Blue Flag Root," in the fresh state, is evidently well established, it has also been recorded that its medicinal activity is impaired by age. From the results of the above experiments, it would appear that it is possible for the drug completely to lose its physiological activity.

A NOTE ON THE ASSAY OF LACTIC ACID.

By Elias Elvove.

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It has been pointed out by Murray [1] that the assay requirement of the U. S. Pharmacopœia in the case of lactic acid (75 per cent.) is out of harmony with its specific gravity requirement since a mixture of 75 per cent. lactic acid and 25 per cent. water has a specific gravity of about 1.175 at 25° C., whereas the U.S.P. specific gravity requirement ("about 1.206 at 25° C.") would correspond to a mixture of 85 to 88 per cent. lactic acid and 12 to 15 per cent. water. It occurred to the writer that this discrepancy might possibly be due to a weak point in the assay method which may cause the acid to appear weaker than it actually is. This further suggested the desirability of avoiding, if possible, the titration of the acid at a boiling temperature as called for by the present U.S.P., since the titration at a boiling temperature instead of at ordinary temperature involves not only comparative inconvenience but is also more liable to yield different results in the hands of different operators.

A consideration of the circumstances of this case appears to show that it is possible to avoid carrying out the titration at a boiling temperature. For it is quite probable that the object of the boiling is to reconvert into acid any lactone anhydride which may be present. And since it is known [2] that lactones in general do not take up water by mere boiling or are only partially converted into acid by such treatment, but are converted into salts of the corresponding

[1] *Merck's Report*, N. Y., 16, 248 (1907).

[2] Watts' Dictionary of Chemistry, vol. iii, p. 114 (1901).

acids by boiling with aqueous solutions of alkalies, it would seem that a much better plan for recovering the acid value of such anhydrides is to boil with a measured excess of a standard solution of alkali and determine the amount of alkali which remains uncombined by titration (at ordinary temperature) with a standard solution of acid. On looking into the matter, it was found that in the French Pharmacopœia (1908) such a plan has actually been adopted, the procedure consisting essentially in adding a measured excess of alkali, boiling for fifteen minutes, cooling, and then titrating the residual alkali. It was thought desirable, therefore, to obtain some comparative data concerning both this residual titration process and that in which the titration is carried out at a boiling temperature.

On titrating a dilute aqueous solution of lactic acid at a boiling temperature it was found that the result thus obtained may vary within comparatively wide limits, depending on what is taken as indicating the end-reaction, whether the coloring of the solution by the phenolphthalein indicator and its remaining on mixing the solution (first indication of neutrality), or whether the boiling is to be continued for some time after that point has been reached, and the length of time the boiling is continued after the first indication of neutrality. In the following work, therefore, two procedures were used in carrying out the titration at a boiling temperature. In one of these (designated as No. 2 in the Tables), the solution was first titrated to neutrality at ordinary temperature and the standard alkali then added in small portions (three drops) at a time and boiled after each such addition of the alkali until a decided pink color remained after the boiling had continued for one minute longer. The other procedure in which the titration was completed at a boiling temperature (designated as No. 3 in the Tables) was carried out in exactly the same way, but the titration was not considered ended until a decided pink color had remained after the boiling had been continued for ten minutes longer. Likewise, in the case of the residual titration after treatment with an excess of alkali, two procedures were used. In one of these (designated as No. 4 in the Tables), the stated amounts of the acid and alkali were well mixed and allowed to stand thirty minutes at ordinary temperature before titrating the excess alkali. In the other (designated as No. 5 in the Tables), the mixture was boiled for fifteen minutes, cooled, and the excess alkali then titrated with the standard acid. And in the latter case, in order to avoid any possibility of the alkali becoming

contaminated with the carbon dioxide which is given off by the flame of the burner, the boiling was effected in Erlenmeyer flasks which were fitted with india-rubber slit valves (Bunsen's valve). Eight samples of lactic acid were examined, the solution of each being also titrated directly at ordinary temperature (designated as procedure No. 1 in the Tables). Seven of these samples were obtained from American firms, while one was obtained from a German firm (Kahlbaum). The results obtained are given in the following tables:

TABLE I.

Showing Lactic Acid Strength of Various Commercial Samples of Lactic Acid as Determined by Various Procedures.

No. of sample.	No. of procedure	Amount of lactic acid solution taken.[a] (c.c.)	N/10 NaOH added before titration. (c.c.)	N/10 NaOH required. (c c.)	Lactic acid strength of sample.
1	1	20	0	19.05	72.14
1	2	20	0	21.90	82.94
1	3	20	0	22.60	85.59
1	4	20	40	23.15	87.67
1	5	20	40	23.15	87.67
2	1	20	0	18.30	71.95
2	2	20	0	21.10	82.95
2	3	20	0	21.90	86.10
2	4	20	40	22.45	88.26
2	5	20	40	22.55	88.65
3	1	20	0	18.05	71.86
3	2	20	0	21.00	83.63
3	3	20	0	21.60	85.99
3	4	20	40	22.40	89.18
3	5	20	40	22.40	89.18
4	1	20	0	18.40	71.72
4	2	20	0	21.25	82.83
4	3	20	0	22.00	85.75
4	4	20	40	22.60	88.10
4	5	20	40	22.70	88.48

[a] The solutions of lactic acid used contained the following amounts in grammes of the respective samples of lactic acid in 1000 c.c. of the solution: No. 1, 11.8825; No. 2, 11.4463; No. 3, 11.3034; No. 4, 11.5446; No. 5, 11.7030; No. 6, 11.6975; No. 7, 11.5736; No. 8, 11.5892.

TABLE I.—*Continued.*

No. of sample.	No. of procedure	Amount of lactic acid solution taken.[3] (c.c.)	N/10 NaOH added before titration. (c.c.)	N/10 NaOH required. (c.c.)	Lactic acid strength of sample.
5	1	20	0	18.70	71.90
5	2	20	0	21.70	83.44
5	3	20	0	22.55	86.71
5	4	20	40	23.15	89.01
5	5	20	40	23.20	89.21
6	1	20	0	18.65	71.75
6	2	20	0	21.60	83.09
6	3	20	0	22.60	86.94
6	4	20	40	23.20	89.25
6	5	20	40	23.25	89.44
7	1	20	0	18.70	72.71
7	2	20	0	21.50	83.59
7	3	20	0	22.25	86.51
7	4	20	40	23.10	89.82
7	5	20	40	23.10	89.82
8	1	20	0	18.35	71.25
8	2	20	0	22.45	87.17
8	3	20	0	23.75	92.22
8	4	20	40	24.30	94.35
8	3	20	40	24.35	94.55

TABLE II.

Showing the Results Obtained on Titrating Lactic Acid with Normal Alkali by Various Procedures.

No. of experiment	No. of procedure[4]	Amount of sample taken. (Gm.)	N/1 NaOH added before titration.[5] (c.c.)	N/1 NaOH required. (c.c.)	Lactic acid strength of sample. (Per cent.)
1	1	2.4280	0	19.50	72.28
2	2	2.4280	0	23.20	85.99
3	3	2.4280	0	23.35	86.55
4	4	2.4143	50	23.50	87.60
5	5	2.3649	50	23.12	87.99
6	6	2.3899	50	23.27	87.63

[4] Procedure No. 6 differed from No. 4 only in that the alkaline mixture was allowed to stand fifteen minutes instead of thirty, before titrating the excess alkali.

[5] Where no alkali was added before the titration an equal volume of water was added instead.

It appears from the results given in the above Tables that the titration of lactic acid at a boiling temperature is not only avoidable, but may even yield varying and considerably lower results than by the residual titration process. Further, the residual titration process is applicable even to dilute (about tenth-normal) aqueous solutions of the lactic acid when the amount of alkali added is about twice the amount necessary to neutralize all the lactic acid, and that practicably as close results may be obtained even if the mixture is not boiled but simply allowed to stand at ordinary temperature for half an hour before titrating the excess alkali; all of the samples of lactic acid examined showing a greater acid strength even by the latter procedure than when titrating at a boiling temperature and taking the end-reaction as that point when the color of the indicator will not completely disappear even by continuing the boiling for ten minutes longer. These results also show that the residual titration process indicates an acidity which is quite in harmony with the U.S.P. specific gravity requirement; while the fact that the present U.S.P. acidity requirement of 75 per cent. is only comparatively little above that which most of the samples examined showed (about 72 per cent.) on direct titration at ordinary temperature (procedure No. 1) and considerably below that shown by procedures Nos. 2 and 3 (about 83 to 86 per cent.), would indicate that the first appearance of neutrality was taken as the end-reaction by the author of the present U.S.P. method. It is also seen that none of the eight samples examined showed an acid strength of less than 87 per cent. when assayed by the residual titration process. A requirement of not less than 85 per cent. instead of the present requirement of not less than 75 per cent. would, therefore, come nearer the actual strength of the lactic acid on the market and would also fairly harmonize this requirement with the specific gravity requirement. Finally, it may be mentioned in this connection that, as shown by Utz,[6] lactic acid is volatile with water vapor and hence for this reason also it would seem best to avoid boiling its aqueous solution when it is desired to estimate its quantity. Likewise, from the point of view of the time required for the assay, the residual titration process is certainly not at a disadvantage in the comparison. For when titrating at a boiling temperature, from about twenty minutes (procedure No. 2) to about forty minutes (procedure No. 3) was

[6] *Chem. Zeit.*, 29, 363–364 (1905).

required for each titration; whereas in the residual titration process not more than thirty minutes need be consumed for the corresponding part of the assay, and even during this time the attention of the operator is not required as closely and repeatedly for each titration as when the titration is carried out at a boiling temperature, and no attention at all is required from the operator during this period when the mixture is simply allowed to stand at ordinary temperature. It would seem, therefore, that the residual titration process has many advantages over the method in which the titration is carried out at a boiling temperature, which should justify its adoption in the next revision of the U.S.P. And since practically as close results are obtained by simply mixing well the acid with about twice the amount of alkali required and allowing the mixture to stand from fifteen to thirty minutes before titrating the excess alkali, as when the alkaline mixture is boiled for fifteen minutes, it would seem that the boiling might be entirely omitted, and the assay method for lactic acid modified to read somewhat as follows:

To about two grammes of the sample of lactic acid, accurately weighed, add 50 c.c. of normal NaOH, mix well, and let stand for half an hour. Then titrate the excess alkali by means of normal sulphuric acid, using phenolphthalein as indicator. The number of cubic centimetres of the alkali found to be required, multiplied by the lactic acid equivalent of 1 c.c. (0.09 Gm.), and this product divided by one-hundredth of the weight of the sample taken for the assay, will express in percentage the lactic acid strength of the sample.

A NOTE ON THE USE OF SULPHUR DIOXIDE IN CHECKING THE EQUIVALENCIES OF THE VOLUMETRIC SOLUTIONS OF IODINE, ALKALI, AND SILVER.

By Elias Elvove.

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In connection with some tests which are being carried out at the Hygienic Laboratory on the efficiency of a sulphur burning stove, designed by Dr. Norman Roberts and Mr. F. A. McDermott of this laboratory, the writer has had occasion to estimate the relative amounts of SO_2 and SO_3 formed in these combustions, by

the method of Kastle and McHargue.[1] This method depends on the reaction expressed by the equation

$$I_2 + SO_2 + 2H_2O = 2HI + H_2SO_4;$$

from which it is seen that for every equivalent of iodine two equivalents of acid result. Hence by determining both the amount of iodine used up in the reaction and also the total acidity after the reaction, we can estimate both the SO_2 and SO_3, since the found excess acidity over that required by the above equation would be a measure of the SO_3 originally present. In the work of Kastle and McHargue, the exact strength of the thiosulphate solution was determined by means of Kahlbaum's resublimed iodine immediately before each experiment and the exact strength of the iodine solution determined by means of the thiosulphate. The exact strength of the sodium hydroxide was frequently determined by means of weighed amounts of pure oxalic acid.

In this connection, it occurred to the writer that the above reaction between SO_2 and iodine might be used with advantage in checking the equivalencies of the standard iodine and hydroxide solutions; and if instead of using an approximate amount of potassium iodide ("about 18 Gm."[2] per litre) in the preparation of the iodine solution, an accurately weighed amount of KI (say 16.602 Gm.[3] per litre) were used, the purity of which has been accurately ascertained by means of the standard silver solution, the values of the iodine and hydroxide solutions could be directly compared, in the same solution, with the standard silver solution; which, as pointed out by the writer,[4] might be used with advantage in the standardization of all of the volumetric solutions ordinarily employed. And, since the value of the permanganate solution can be ascertained by titrating with thiosulphate (the strength of which is measured by the iodine solution) the amount of iodine which a definite amount of the $KMnO_4$ can liberate from a solution of KI acidified with sulphuric acid, if we prove the accuracy of our iodine solution in terms of the silver solution we can thus also check the accuracy of the value assigned to the permanganate solution. In

[1] *Amer. Chem. Jour.*, **38**, 465–475 (1907); and *Chem. News*, **96**, 236–238 (1907).

[2] Sutton: Volumetric Analysis, 9th ed., p. 133.

[3] This amount of KI per litre would yield a solution exactly tenth-normal (using the 1910 international atomic weights).

[4] *Amer. Jour. Pharm.*, **82**, 203–211 (1910).

other words the reaction between sulphur dioxide and iodine might be made, so to speak, the connecting link whereby the typical representatives of the four different classes of volumetric solutions, namely, the permanganate, iodine, alkali, and silver solutions, are connected together and their relative values established and referred back to the silver solution which was used in their first standardization.

The standardization and checking of the volumetric solutions as thus outlined seems especially advantageous in the case referred to above (the volumetric estimation of SO_2 and SO_3 when occurring together), for not only would we be able to refer all the results to one standard instead of two different standards (*e.g.*, iodine and oxalic acid), but we could also base the entire work on a standard which is more readily kept unaltered and is more convenient than is the case with solid iodine. Thus, for example, in the estimation of the SO_2 and SO_3 by the method of Kastle and McHargue, we might base the entire work on the value of our standard sulphuric acid solution. By means of the latter, the value of the NaOH solution could be readily ascertained; and by just decolorizing a definite amount of the iodine solution with a dilute, freshly prepared solution of sulphur dioxide (the strength of which need not be known) and determining the total acidity by means of the NaOH solution, we would obtain a check on the correctness of the assigned relative values of the iodine and hydroxide solutions; and since the resulting iodide could now be determined by means of the standard silver solution, we would thus obtain a check on the value of the iodine solution by direct reference to the standard silver solution. In this way we would not only avoid the weighing and handling of the solid iodine every time we want to check our solutions, but would also base the entire work on a *single* standard; and having found that when working with the solution of pure sulphur dioxide the results obtained are in close agreement with the theory, we could feel more certain when working in this way than when employing the double standard, that the subsequent results with the mixture of SO_2 and SO_3, however slight the variation may be from the results as obtained with the pure SO_2, are not due to any error in the standardization of our solutions, but solely to the presence of a small amount of SO_3.

The following data will illustrate the plan for standardizing all the ordinary volumetric solutions by means of pure metallic silver

as the ultimate standard and the subsequent checking of the equivalencies thus found, by means of the reaction between sulphur dioxide and iodine. All the solutions were prepared in the ordinary way except the iodine solution, in the case of which an accurately weighed amount of pure KI, 16.602 Gm. per litre, was used instead of "about 18 Gm." which is ordinarily used. Of this KI, 0.5442 Gm. was found equivalent to 32.7 c.c. of the N/10 $AgNO_3$ solution. This would make the iodine solution 99.85 per cent. tenth-normal with reference to its KI content, which value was used in the subsequent calculations. The water used was free from oxygen and carbon dioxide. When a fairly rapid current of SO_2 is available, the time required for obtaining about 50 c.c. of the sulphur dioxide solution, of a strength suitable for the present purpose, need not exceed fifteen seconds; hence no special care was taken to entirely avoid contact of the liquid with the atmosphere, but the SO_2 solution thus obtained was quickly transferred to a burette and used immediately for decolorizing the iodine solution. The following results were obtained by working according to the plan above outlined.

1. Used 0.4287 Gm. of the pure metallic silver (equivalent to 39.74 c.c. N/10 $AgNO_3$) and found it to require 39.62 c.c. of the N/10 NH_4CNS. Therefore, the normality of the NH_4CNS solution, expressed in percentage of an exact N/10 solution, is 100.30.

2. Found that 50 c.c. of the N/10 $AgNO_3$ are equivalent to 49.9 c.c. of the above N/10 NH_4CNS. Therefore, the normality of the $AgNO_3$ solution, expressed as above, is 100.10.

3. Found that 45 c.c. of the N/10 HCl are equivalent to 45.25 c.c. of the above N/10 $AgNO_3$. Therefore, the normality of the HCl solution, expressed as above, is 100.65.

4. Found that 45 c.c. of the above N/10 HCl are equivalent to 45.05 c.c. of the N/10 NaOH. Therefore, the normality of the NaOH solution, expressed as above is 100.54.

5. Found that 45 c.c of the N/10 oxalic acid are equivalent to 44.7 c.c. of the above N/10 NaOH. Therefore, the normality of the oxalic solution, expressed as above, is 99.86.

6. Found that 45 c.c. of the above N/10 oxalic acid are equivalent to 45.15 c.c. of the N/10 $KMnO_4$. Therefore, the normality of the $KMnO_4$ solution, expressed as above, is 99.53.

7. Found that 45 c.c. of the above N/10 $KMnO_4$ are equivalent to 45.45 c.c. of the N/10 $Na_2S_2O_3$. Therefore, the normality of the thiosulphate solution, expressed as above, is 98.55.

8. Found that 50 c.c. of the above N/10 $Na_2S_2O_3$ are equivalent to 49.5 c.c. of the N/10 iodine. Therefore, the normality of the iodine solution, expressed as above, is 99.55.

Control.—Used 25 c.c. of the above N/10 iodine. This was just decolorized by means of a dilute, freshly prepared aqueous solution of SO_2. On titrating the total acidity with the above N/10 NaOH, it was found to require 49.7 c.c. The solution was then acidified with 5 c.c. of 10 per cent. nitric acid, 55 c.c. of the above N/10 $AgNO_3$ added, and the excess silver in the filtrate determined by means of the above N/10 NH_4CNS. In this way, it was found that the total iodide in the solution was equivalent to 49.85 c.c. of the above N/10 $AgNO_3$ (or 49.9 c.c. of an exact N/10 $AgNO_3$). Subtracting from this 24.96 c.c. (the calculated value, in terms of N/10 $AgNO_3$, of the added KI in the 25 c.c. of the iodine solution), it would make the 25 c.c. of iodine equivalent to 24.94 c.c. of an exact N/10 $AgNO_3$.

Expressed in percentage of an exact N/10 solution, we would have as the value of the iodine solution by the SO_2 control, 99.76.

Corresponding value as found through the use of the above-mentioned intermediary solutions, 99.55.

On the basis of the iodine solution being 99.76 per cent. tenth-normal, it should have required 49.88 c.c. of an exact N/10 NaOH. Now, since only 49.7 c.c. of the above N/10 NaOH was required, it would show that the latter is a little stronger than tenth-normal.

Expressed in percentage of an exact N/10 solution, we would have as the value of the NaOH solution by the SO_2 control, 100.36.

Corresponding value as found through the use of the above-mentioned intermediary solutions, 100.54.

These results may be considered as showing a fair agreement between the first standardization by the silver solution, through the use of the above-mentioned intermediary solutions, and the SO_2 control, especially when it is remembered that an error of one drop in any of the measurements or titrations would correspond to a difference of about 0.1 to 0.2 per cent. It would seem, therefore, that the reaction between sulphur dioxide and iodine might be used as a convenient check on the found equivalencies of the iodine and hydroxide solutions in terms of the substance chosen as the ultimate standard—pure metallic silver.

REPORT OF THE PROCEEDINGS OF THE TENTH INTERNATIONAL CONGRESS OF PHARMACY, BRUSSELS, SEPTEMBER 1–6, 1910.*

By Reid Hunt,
Professor of Pharmacology, Hygienic Laboratory, United States Public Health and Marine-Hospital Service.

The opening session was held in the Palais des Academies September 1. More than 600 delegates, about one-half of whom came from countries other than Belgium, were present. Sixteen foreign governments had formally accepted the invitation to participate in the congress, and 20 were represented by official delegates. Delegates were present from the following American Republics: Argentina, Chilé, Venezuela, Guatemala, San Salvador, Haiti, and the United States.

The work of the congress was outlined at the opening meeting, at which the governor of Brabant, representing the minister of the interior; the president and secretary of the congress; and several of the foreign delegates, made addresses. The speakers emphasized, as the two subjects of greatest international interest: (1) The further unification of the pharmacopœias, with special reference to the adoption of uniform methods of assay of important drugs; and (2) the control of the sale of specialties (proprietary medicines), from the stand-point of public health as well as that of the material interests of the pharmacists. The governor of Brabant, M. Beco, formerly of the ministerial department having control of public health, hygiene, and pharmacy, urged the congress to add to its programme the subject of public hygiene, stating that he did not believe that pharmacists are as well qualified to deal with the problems of this subject as is desirable, and pointing out the possibilities of pharmacists securing for themselves a more privileged position if they will extend their activities beyond the narrower commercial pursuits.

The service of the Belgian Government in connection with the conference of 1902, which resulted in the securing of a greater degree of uniformity in the formulas of heroic medicines in the various pharmacopœias, was the subject of much favorable comment on the part of several of the foreign delegates.

* Public Health Reports, volume xxv, No. 40, 1910, pp. 1406–1408.

On the succeeding days the congress met in two sections—scientific and professional. At each of these certain general questions, announced in advance, were discussed. A considerable number of communications, dealing for the most part with subjects of general scientific importance and all of international interest, were also presented. As a result of these discussions a number of resolutions were drawn up and voted upon, first by the sections and secondly by the entire congress at its concluding session September 6.

The first of the resolutions, presented by the scientific section, related to the unification of the methods for the assay of crude drugs and of galenical preparations, and for the determination of physical constants. The great importance of this subject, from the stand-point not only of medicine but also from that of international commerce, was emphasized. The congress requested the Belgian government to call an international conference for the unifying of the methods of analysis of the heroic medicaments; it also expressed the hope that, in the matter of alkaloidal assays, the commission would adopt, as far as possible, gravimetric methods. These conclusions and resolutions were based largely upon a paper by Doctor Schamelhout, who treated the subject from the stand-point of a practical pharmacist.

The second resolution related to the international unification of the reagents used in pharmacopœial work. It was pointed out how such a unification would aid in securing uniform analytical results and in the interpretation of the different pharmacopœias.

The third set of resolutions, which were adopted after prolonged and thorough discussion, related to the control of antiseptics, with special reference to the securing of commercial honesty and the safeguarding of the public. The congress expressed the opinion that such preparations should not be placed upon the market until they have been officially examined, both chemically and bacteriologically, and have received the approval of the departments of public health; that their efficiency should be determined and the claims made by the manufacturers be examined; that the amount of their active ingredients and their bactericidal strength should be stated, and that the sale of those claiming to possess therapeutic properties and of those containing poisons the sale of which is legally restricted should be limited to pharmacists.

The fourth resolution related to the introduction into the curricula of schools of pharmacy of courses on the analysis of certain

physiological and pathological secretions, especially of that of the feces. It was pointed out in the discussion that such work properly comes within the province of the pharmacist as a chemist and that it makes another professional bond between him and the physician.

The fifth resolution related to the preparation of galenicals by pharmacists. The latter were urged to make these preparations themselves as far as possible.

In addition to the formal reports a number of important scientific communications were made, some of which led to the adoption of further resolutions. Thus, as the result of a communication by Möller, it was resolved to advocate the adoption as an international standard of colors the standard of Klinchsieck and Valette. A paper by Hercod led to the adoption of a resolution in favor of the appointment of an international commission to establish a method for the standardization of pharmacopœial preparations of pepsin and for establishing a standard strength for this product.

A resolution was also passed expressing the opinion that it is desirable for the committees on pharmacopœial revision to publish each year supplements calling attention to the real scientific advances made.

Among the notable contributions made in the scientific section the following may be mentioned: Perrot, on the preservation of important plant drugs by the destruction of the intracellular enzymes; Leger, on the constitution of the aloins; Bourquelot, on glucosides; Goris, on plants containing caffeine.

The first of the resolutions presented by the section on professional interests related to the control of the sale of specialties. The basis for the discussion of the subject, which was prolonged and animated, was the very comprehensive report prepared by Breugelmans, Daminet, and Staes in which was reviewed the legislation on the subject in the leading countries of the world. Although the difficulties and complications which have arisen from the great increase in the number of such preparations and the problem resulting from the competition of manufactures were recognized, the discussion was limited largely to the phases which more directly concern the commercial side of pharmacy and especially to the subject of price protection. It was recognized that this is a question which will have to be solved by each country, but certain general principles were proposed, and the congress expressed the opinion that the sale

of medical specialties should, in all countries, be reserved to the pharmacists.

The second resolution presented by the section on professional interests related to the formation of an international pharmaceutical federation having for its purpose the protection of pharmacy as a profession and as an applied science. It was decided to appoint a commission to prepare a constitution for such a federation and to accept an invitation from the government of Holland to make The Hague its headquarters.

The third resolution related to the representation on pharmacopœial commissions of practical pharmacy, and the fourth to the limitation of the number of pharmacies.

It was also resolved to make the question of patents and trademarks one of the subjects for discussion at the next international congress of pharmacy.

In addition to the scientific programme, visits were made to the exposition, where the chemical and pharmaceutical exhibits of different countries were explained, and to dairies devoted to the production of milk for infants.

The members of the congress were the recipients of the most generous hospitality on the part of the officers of the congress and the pharmacists of Belgium.

THE PHARMACOPŒIA OF RUSSIA.

By M. I. Wilbert, Washington, D. C.

The new, sixth edition, of the Russian Pharmacopœia, published in 1910, is undoubtedly one of the more interesting books of its kind and it is perhaps unfortunate indeed that its appearance only in the Russian language makes it comparatively inaccessible to much the greater number of American Pharmacists. Fortunately, however, the official titles are Latin and the numerals in the formulæ are Arabic.

The general appearance of the book is all that could be desired; it is neatly bound and excellently well printed on a good quality of paper, and would generally be accepted as a thoroughly modern, up-to-date publication.

The book contains a total of XVIII and 591 pages with descrip-

tions of 617 official articles. The official articles include 162 botanical drugs, 15 drugs of animal origin, 195 chemical substances, 218 pharmaceutical preparations and 27 general descriptions.

The general descriptions are unique in that they include not alone general descriptions of types of pharmaceutical preparations but also descriptions of parts of plants, such as seeds, flowers, leaves and roots.

The Latin nomenclature has much in common with that found in the German Pharmacopœia, the new French Codex and the new Swiss Pharmacopœia so that there is even here a promise that the future will bring with it a proximation to international uniformity so far as the Latin names of widely used substances are concerned, even if it is, perhaps, Utopian to expect that we may yet have absolute uniformity.

Another indication that bodes well for the closer approximation of the several national pharmacopœias is the fact that this edition of the Russian Pharmacopœia like the ninth edition of the Swedish Pharmacopœia and the new third edition of the Italian Pharmacopœia was prepared in advance of the usual time of revision for the sole purpose of including the provisions of the Brussels' Conference Protocol.

The agreement adopted at the Brussels Conference for the unification of pharmacopœial formulæ for potent medicaments is reprinted entire in the prefatory pages to the book, and the provisions appear to have been generally adopted in all of the formulas included in the body of the pharmacopœia itself.

Among the titles representing the newer additions to our materia medica we find: Æthylum bromatum, Agar-Agar, Ammonium sulfoichthyolicum, Ammonium sozojodolicum, Antipyrinum, Chinosolum, Diuretinum (Theobrominum-natrio-salicylicum), Heroinum, Heroinum hydrochloricum, Phenacetinum, Salipyrinum, Salolum, Serum antidiphthericum, Sulfonalum, and Vaselinum.

Many of these titles illustrate the difficulties that we will be obliged to contend with for many years to come in developing names that are universally acceptable or applicable, because of the widely varying practices in connection with trade names and the protection given to individuals, in different countries, by laws governing trade-marks.

Chemical tests and assay processes have been given considerable attention and 33 pages are devoted to an enumeration of the reagents, volumetric solutions, and chemical apparatus necessary to apply the several official tests.

An appendix contains a number of tables including a list of potent medicaments, table of maximum single and daily doses, table of specific gravity of official liquids, and an alcohol table giving the per cent. of alcohol by weight and by volume of mixtures of alcohol and water at 15° C.

A double column index covering 32 pages completes a book that promises to be more than a passing factor in developing pharmacy in the country of its origin and will no doubt contribute much toward developing international unification of standards for potent or widely used medicaments.

BOOK REVIEWS

ABSTRACT OF PROCEEDINGS, UNITED STATES PHARMACOPŒIAL CONVENTION, 1910. Compiled and edited by the Secretary of the Convention. Published by the Board of Trustees, November 30, 1910.

Pharmacists and others who are interested in the Pharmacopœia of the United States will welcome this somewhat belated authoritative report of the United States Pharmacopœial Convention, primarily because of the information it contains, but also because it provides, for ready reference, a comprehensive and authentic account of the strenuous sessions of the Convention held in the City of Washington, in May, 1910, to provide for the revision of the Pharmacopœia of the United States now in force.

This abstract of the proceedings constitutes an octavo pamphlet of 110 pages, and in addition to a rather complete account of the actual happenings, presents verbatim reproductions of the several addresses and the reports of officers of the convention. In addition to the proceedings the pamphlet also contains:

1. A financial statement covering all of the receipts and expenditures during the period, from May, 1900, to May, 1910.

2. The Constitution and By-laws as revised by the Convention of 1910.

3. The official list of members of the U. S. Pharmacopœial Convention of 1910.

This latter list is particularly interesting in view of the unquestioned ruling of the Chair: "That anyone elected a delegate here, who has not come, is not a member of this Convention, cannot be elected a member of any Committee, nor as an officer."

To all intents and purposes this ruling limits membership in the Convention and official participation in the conduct of its affairs during the decennium to accredited delegates actually in attendance at the Convention.

Because of the information that it contains, this pamphlet should be widely distributed and should be frequently consulted by all who are interested in the Pharmacopœia of the United States and the development of its objects and its uses. M.I.W.

HYGIENIC LABORATORY BULLETIN No. 70. A Study of Melting-point Determinations, with special reference to the melting-point requirements of the Pharmacopœia. By George A. Menge, Washington, Government Printing Office, 1910, p. 101.

This Bulletin is essentially a report on progress of a study of melting-point determinations made for and in co-operation with the Committee of Revision of the Pharmacopœia of the United States, and constitutes perhaps the most comprehensive review of this factor that has as yet been published, from a pharmaceutical point of view.

The various causes for divergence in the melting-point interpretations are reviewed and illustrated. The author also illustrates and figures the necessary appliances for a comparatively simple method that appears to be well adapted to present pharmacopœial needs.

The experimental data reported includes melting-point determinations on 24 official substances and amply suffices to show the need for adopting a definite and uniform method and procedure for determining the melting point of official substances if this factor is to be accepted as an indication of the identity or purity of official substances.

Pharmacists and chemists who are interested in pharmacopœial tests and requirements will find much in this Bulletin to assist them in determining the probable value of melting-point determinations in connection with official chemicals.

Copies of the Bulletin may be had on application to the Surgeon-General, U. S. Public Health and Marine-Hospital Service, Washington, D. C.

THE MICROSCOPICAL EXAMINATION OF FOODS AND DRUGS. A practical introduction to the methods adopted in the microscopical examination of foods and drugs, in the entire, crushed and powdered states. By Henry George Greenish, F.I.C., F.L.S., Professor of Pharmaceutics to the Pharmaceutical Society of Great Britain and Director of the Pharmacy Research Laboratory. With 229 illustrations. Second edition. Philadelphia: P. Blakiston's Son & Co., 1012 Walnut St., 1910. $3.00 net.

Professor Greenish is well known as an author of several standard works and a number of excellent papers. The present work is a laboratory manual, treating of the general technic employed in the microscopic examination of vegetable drugs and food products and giving a fairly large number of typical examples under each of the classes considered. There are some 15 sections, in which are considered: starches, hairs and textile fibres, spores and glands, ergot, woods, stems, leaves, flowers, barks, seeds, fruits, rhizomes, roots, adulterants of powdered foods and drugs and a general scheme for the examination of powders.

While the work is especially written for the students of the School of Pharmacy of the Pharmaceutical Society of Great Britain, it could be well adapted by teachers in other schools and colleges of pharmacy in their work. The following statement from the preface is deserving the attention of the teachers in those schools of pharmacy where the subject of pharmacognosy is not taught as a means to a practical end. "Before the microscopical examination of vegetable foods and drugs can be intelligently practised, a general knowledge of botany and a fairly sound and thorough acquaintance with botanical histology are absolutely necessary. It is as impossible for anyone to become a competent microscopist without such preliminary knowledge, as to become a competent analytical chemist without first acquiring a sound knowledge of the theory and principles of the science of chemistry. For this reason it appears to me that the training now given in the School of Pharmacy of the Pharmaceutical Society, comprising as it does, a knowledge of the principles upon which the sciences of botany and chemis-

try rest as well as training in the application of the knowledge thus acquired, is admirably adapted to fit a man to become an expert not only in the microscopical, but also in the chemical examination of foods and drugs." Again and again is one reminded in this work of Greenish's of the observation of Hassall in regard to the application of the microscope "that there is scarcely a vegetable article of consumption, not a liquid, which may not be distinguished by means of that instrument. Further, that all those adulterations of these articles which consist in the addition of other vegetable substances and which constitute by far the majority of the adulterations practised, may likewise be discovered and discriminated by the same process." Furthermore, Greenish calls attention to the fact that the "Investigations recently conducted by the Society at the request of the General Medical Council have also shown that the microscopical examination of powdered drugs yields results of far greater value in determining their identity and purity than such chemical data as the amount of ash yielded by them." In view of the splendid work done by Greenish this work will do much in making a rational consideration of the subject of pharmacognosy possible and cause students and pharmacists to be willing to devote a sufficient amount of time to the mastery of the principles involved in the work.

SUSAN HAYHURST.

The memorial exercises, held at the Philadelphia College of Pharmacy on November 15, 1910, in connection with the presentation to the college of a portrait of Dr. Susan Hayhurst, were a worthy tribute to this pioneer woman pharmacist, to whom the majority of the women graduates of the Philadelphia College of Pharmacy are indebted for the opportunity she gave them to acquire a knowledge of the practical side of pharmacy.

Dr. Hayhurst matriculated in the Philadelphia College of Pharmacy in 1879, at the age of 59, and graduated four years later. During her more than thirty years of service as apothecary of the Woman's Hospital of Philadelphia she gave employment to some sixty-five young women, a number of whom were present on this occasion and contributed to the testimonial held in honor of prob-

ably the first woman graduate to practise pharmacy in America if not the world.[1]

Shortly after the death of Dr. Hayhurst on August 7, 1909, some of the women graduates of the college, under the leadership of Miss Sarah L. Naly, her successor as apothecary of the Woman's Hospital, determined to have a portrait done in oil for presentation to the College. Early in November, 1909, they obtained the consent of the Board of Trustees to hang the proposed painting in the Museum of the College and soon thereafter the Committee of the women graduates secured the services of a Philadelphia artist, Miss Florence J. Newton, to execute the work. The portrait was made after a photograph of Dr. Hayhurst, taken but a few months before her decease by the well-known photographer, Mr. F. Gutekunst, assisted by the artist's personal recollection of her subject. A reproduction of the photograph is given in the frontispiece. The painting is a most excellent one, being about two-thirds life-size, and hangs in a prominent place in the Museum, selected by the women graduates.

The president of the College, Mr. Howard B. French, presided at the presentation exercises, and in opening the meeting referred to the splendid services of Dr. Hayhurst for the advancement of the Woman's Hospital of Philadelphia, and spoke of his personal knowledge of her work for the benefit of women in pharmacy and her noble example to her students and apprentices.

Professor Remington was to have presented the portrait on behalf of the women graduates, but was unavoidably absent and his address was read by Professor Kraemer. It was as follows:

MR. HOWARD B. FRENCH,

President of the Philadelphia College of Pharmacy:

On behalf of the women graduates of the Philadelphia College of Pharmacy, we have much pleasure in presenting to the College this portrait of Susan Hayhurst, M.D., Ph.G., who was the first woman graduate of this College.

The long and useful career of our deceased friend was marked

[1] Elizabeth Marshall, though not a graduate in pharmacy, was probably the first woman to practise pharmacy in this country (see this JOURNAL, 1904, p. 271), and it is recorded that Dr. Mary Putnam Jacobi graduated from the New York College of Pharmacy in 1883, the year of Dr. Hayhurst's graduation, but it is probable that she never engaged in the practice, having become distinguished as a teacher and practitioner in medicine.—EDITOR.

by many acts of kindness and she made the path easy for many a struggling woman, striving for the coveted diploma of her Alma Mater. Dr. Hayhurst graduated from the Woman's Medical College in 1857 and from our College in 1883.

In her position as apothecary of the Woman's Hospital, she had the opportunity of giving practical instruction to girls who had chosen pharmacy for a vocation and her labors were more than appreciated, because for many years the dispensary of the Woman's Hospital was the only place where girls could secure practical knowledge of the business, owing to the prejudice which existed some years ago against women pharmacists.

As a student, Dr. Hayhurst was diligent in her efforts to acquire pharmaceutical knowledge. Until within the last few years of her life, she could be found poring over books and freely giving to her associates and younger women the information which she had obtained. She became a veritable mine of practical points.

Her disposition was kindly, yet when occasion required, she could express herself forcibly, particularly when some of the women would neglect some duty or commit, as she would say herself, "a pharmaceutical crime."

It is rarely given to any one to spend thirty odd years in teaching pharmacy but Dr. Hayhurst has this distinction, and it will be many years before her record of earnest, helpful, devoted service will be equalled. She was loyal to her Alma Mater to the last and she never tired of singing the praises of her beloved College.

To the women and girls who have had the benefit of her instruction the example of her beautiful life of service must be an inspiration. Gentle but firm, steadfast and unyielding in her devotion, she has gone on before, and Mr. President we now offer to you as the representative of this College, this portrait, believing that you will cherish it and give it a place among the portraits of those honored ones, who have testified their allegiance to the oldest and best College of Pharmacy in America.

In accepting the portrait, Mr. French said that it gave him great pleasure as president of the College to receive the portrait of Dr. Hayhurst and that it would find a place among the portraits of other leaders in American pharmacy on the walls of the College. He expressed his appreciation of the loyalty of the women graduates to their Alma Mater, and then called for the reading of a biographi-

cal sketch of Dr. Hayhurst by Miss Susannah G. Haydock, which will be published in the *Alumni Report* of the College. Additional remarks were made by Miss Naly, Dr. Anna E. Broomall, Mr. Charles C. Parsons, Mr. E. M. Boring, Prof. C. B. Lowe and Professor Kraemer.

The following sketch of Dr. Hayhurst is prepared in large part from the data secured through Miss Florence Yaple from various of her friends and relatives, especially her nephew, Mr. Walter F. Hayhurst, a lawyer residing in Lambertville, N. J., and extracts adapted from a sketch by Miss Sue P. Chambers which appeared in *Woman's Progress* some years ago (January, 1895).

Dr. Susan Hayhurst was a descendant of Cuthbert Hayhurst, a member and minister of Settle Monthly Meeting of Friends, in Yorkshire, England, who came to this country in the ship "Welcome" with William Penn; he died the year following and was buried September 2, 1683. His widow, Mary, took up certain lands which were allotted to him in Middletown Township, Bucks County, Pa., near the present village of Langhorne. Four generations later her father, Thomas Hayhurst, was born in this neighborhood, and married Martha Croasdale, also of an old Quaker family; he was a man self-educated, but of considerable ability and many talents. He was a surveyor and scrivener. He afterwards moved with his family to Wilmington and Camden, Delaware, where he engaged in the manufacture of "earthenware," and later engaged in the commission business in Philadelphia. He also engaged in school teaching, and about the year 1840 with his son, Jeremiah Hayhurst, the father of Walter F. Hayhurst, already mentioned, kept a select school at West Chester, Pa. There were eight children in the family and Susan was the second, having been born December 25, 1820, at Middletown, Pa.

Her schoolgirl days were passed at an institution in Wilmington, under the influence of "Friends." As a student she was particularly apt in mathematics and could recite verbatim any amount of text. She would have been considered an apt pupil, but when she came to teach found the want of that technical training which she afterwards obtained by taking the best instructor available in whatever study she wished to pursue.

She commenced teaching when quite a young girl, her first school being in Bucks County, Pa., near Newtown, and spent some years

in various country schools—an important and interesting portion of her life, as much of her time was spent with a class of people interested in the stirring events of that day, and many of them not lacking in intellectual culture. At one time she was a frequent companion of a skilled botanist, and together they became acquainted with the wild flowers of field and forest and meadow.

When her parents moved to Philadelphia, amongst her new acquaintances she found, in one of the professors of the Woman's Medical College, a very superior teacher of chemistry. To avail herself of Dr. Johnson's instruction, she entered the college for that and physiology, thinking to better qualify herself for teaching these branches. After some months' study, becoming deeply interested, she decided to take the entire medical course. To do this it was necessary to teach in the summer while attending lectures in the winter. Again she went to the country, where she found liberal-minded people and a devoted botanist. There she and her medical books were curiosities.

The last year of her course at college she was induced to take charge of the Friends' School at Fourth and Green Streets, Philadelphia, and was principal of that school when she graduated in medicine in 1857.

That graduation day would contrast greatly with one from the same college at this time. The medical woman of to-day knows little of the social ostracism that attended the pioneers in this profession. Now unnoticed in the crowd, or respected and even honored whenever they come to the front; in past days, even on the street, they were subject to indignities from their fellow students of other medical colleges. The commencement (numbering ten candidates) was a quiet affair, with a few friends who were brave enough to stand by those, who, better than they then knew, "were paving the way for liberal education." On this occasion, Prof. C. D. Cleveland, the writer on English Literature, then president of the college, came forward and stated that he had sought in vain in this city for a reverend who would take part in the services, and then himself—a layman—asked the Divine blessing on these young women who were about to enter an almost untried field.

Dr. Hayhurst still continued ten years at Fourth and Green Streets, then opened a school of her own with a class of fifty, many of whom had been her former pupils.

We next find her going West for a much-needed rest and change, and to visit friends. Then she was asked to organize a new public school in the town she was visiting, on the Philadelphia plan. Having finished this work and made the visit, she at the end of a year returned to Philadelphia, and with the intention of taking up the practice of medicine, entered the Woman's Hospital to familiarize herself with the advance ideas in medicine since her graduation.

She was solicited by the management of the hospital to take charge of its pharmaceutical department, a position of great responsibility, and entered on her new duties in 1876.

With her life-long habit of knowing—what may be known—of the subject in hand, and having turned away from that which she had intended as a life work, she again took up the student life in connection with daily service as pharmacist at the hospital. It was not her habit to leave anything undone in the way of investigation that could add to her efficiency, so she sought and obtained permission to matriculate at the Philadelphia College of Pharmacy.

No difficulty surrounded her attendance of these lectures. The boys were probably not glad to receive this one woman who entered a class heretofore occupied entirely by men, and who might mar their college freedom, but they made no offensive demonstration.

When she took her tickets it was a question whether the college would grant her its diploma, but on the completion of its course, she was graduated in 1883.

Professor Remington, in his valedictory address, said: "It is the best and largest class we have ever graduated, and we do what has never been done in the history of these sixty-two commencements, confer the degree on a woman." Then arose such a storm of applause as would have satisfied the most ambitious debutante. The large hall was filled in every part, and the graduates, 150 in number, seemed to vie with the audience in expressing their gratification.

The contrast in twenty-six years between these two commencements in which Dr. Hayhurst participated marks the advance of public sentiment. At the first when it was an innovation for women to enter the medical world, there were but ten graduates, a small audience, and no enthusiasm. A wide acquaintance with medical students made her influence far-reaching. From India, China and Japan came messages, gifts of rare and beautiful things, thanks

for advice given, for supplies of all kinds selected. Many a missionary owed the successful equipment for her work to this kindly care, either before she went or in answer to requests after she arrived in the foreign country. The purchase and manufacture of supplies for her own department in the hospital passed under Dr. Hayhurst's supervision, "and a care" at times was extended to matters not connected with drugs. To have seen her with hammer and screw-driver in hand one might have wondered if she possessed any of the characteristics of that ancestor who had "a very good mechanical head," according to his neighbor and friend, the one time Governor of New Jersey. All this busy life, yet it did not prevent an every summer devotion to a flower garden which furnished many a bouquet for friend and invalid, nor the taking up of a new study, or the critical pursuit of an old one.

Her reading was very wide, and she read very much poetry and fiction for her personal pleasure, but seemed to read science and history with quite as much satisfaction. Her method of thought was logical and she was interested intensely in all the questions of the day. She believed in Woman Suffrage, although not taking much active part in the movement, and sometimes regarding with amusement the methods of some of its advocates. She was intensely interested in the abolition of slavery, and afterwards in the elevation of the colored people. She was a consistent member of the Society of Friends and a regular attendant at meeting, although seldom taking any active part in the business.

It is stated that she met William Loyd Garrison, Wendel Phillips, the Burleighs, Lucretia Mott, and many other prominent anti-slavery advocates. In later years she was particularly intimate with Anna Jeans, the Philadelphia philanthropist and was consulted by her in the distribution of her charities.

In enumerating Dr. Hayhurst's activities reference should also be made to the fact that she was taught surveying by her father and that she assisted him in this line of work. Latterly her whole interest was centred in the Woman's Hospital; in addition to the duties of her regular position, she was frequently consulted by the managers and took an active part in raising funds for many improvements. She was particularly cheerful in her manner and enjoyed a joke. An incident is cited that when they were celebrating the "Silver Anniversary" of her employment at the hospital

some newspaper man wanted her age and she refused to give it. Afterwards she said that the reason she refused was the fear that the people would think she was getting too old to take an active part in business.

Dr. Hayhurst possessed marked social qualities, and was a member of the following societies: The Century Club, of which she was a charter member; The New Century Guild (both women's clubs); The Browning Club of Philadelphia, in which, however, her membership cannot be confirmed by the present secretary; The American Academy of Political and Social Science; The Woman's Suffrage Society of Philadelphia, and The Pennsylvania Pharmaceutical Association.

She was a good disciplinarian, and during all the years of her charge of the dispensary of the Woman's Hospital it was characterized by cleanliness, neatness and orderliness in every part. Not only this, she provided ample equipment in the way of pharmaceutical apparatus and always sought to use the most approved methods in the making of preparations, the majority of which were made by her assistants. She also considered it a part of her duty to look into the qualities of new remedies, and it is to her credit that very few, if any, of the fraudulent or worthless preparations offered for sale ever found their way into the dispensary of the Woman's Hospital. She always spoke of her assistants as "my girls," and was ever mindful of their interests, both social and intellectual, frequently inviting them to accompany her to the meetings of the societies of which she was a member.

At a meeting of the Board of Managers of the Woman's Hospital, held September 10, the following resolutions were offered:

Resolved, That in the death of our valued Friend, Dr. Susan Hayhurst, the hospital has lost a faithful and devoted worker; therefore

Resolved, That the thirty-three years spent in our midst will long be remembered by us, and her influence be felt, especially in the department over which she presided; the aim of her life was to further the interests, and widen the influence of the hospital, and by her faithfulness to this duty, she showed her love for it. While we miss her presence, we know that "our loss is her everlasting gain." Therefore,

Resolved, That a copy of these resolutions be entered on the Minutes of the Board, and a copy sent to the family.

THE CITY OF WASHINGTON BRANCH OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

The regular stated meeting of the City of Washington Branch of the American Pharmaceutical Association was held at the Hotel Raleigh on the evening of November 11, 1910, with the members of the Association of Official Agricultural Chemists as guests.

The subject under discussion was The Pharmacopœial Convention of 1910 and the prospective Pharmacopœia of the United States.

Dr. H. W. Wiley, the President of the United States Pharmacopœial Convention, presented a communication in the course of which he outlined his opinions regarding the Pharmacopœia and the methods to be followed in revising it.

Prof. Joseph P. Remington, the Chairman of the Committee of Revision, expressed the opinion that the Convention was indeed fortunate in having Dr. Harvey W. Wiley as its president and presented a short communication in the course of which he commented on some of the more important points referred to by Dr. Wiley and outlined the nature and amount of work that had been accomplished during the summer months.

Commenting further on the scope of the Pharmacopœia he expressed the belief that the real sentiment of both physicians and pharmacists was neither in favor of a skeleton pharmacopœia nor of a padded pharmacopœia, but of what he was pleased to designate as a sane pharmacopœia.

He then called attention to a prospective communication by Prof. Rusby, for the Association of Official Agricultural Chemists, in which he points out the need for having a book of standards for all drugs that are widely used, so as to facilitate and simplify the work of the United States Custom House officials in connection with the importation of drugs.

Prof. Remington also pointed out that for many years the Pharmacopœia was a closed book to the medical profession because its members had been lead away from it by the detail man of the manufacturer and proprietary medicine maker. The resulting decay of therapeutics has brought about a state of confusion and a tendency to therapeutic nihilism that he considers to be most unfortunate.

He holds that physicians do not know a sufficient number of U.S.P. preparations and do not appreciate the fact that their fellow practitioners in different parts of the country, and in different cities,

use totally different medicines, for which the Pharmacopœia of the United States should furnish standards.

Prof. I. V. S. Stanislaus, of Philadelphia, asserted that the paper by Dr. Wiley had been to him a revelation and a treat true and rare. He had been particularly impressed by the reference to needless duplication of drugs having similar properties and willingly endorsed the proposition to delete useless duplications from the Pharmacopœia.

He pointed out that the content of previous pharmacopœias represented the selection and dictates of the few and not of the many and expressed the hope that in the forthcoming Pharmacopœia greater care be exercised regarding admissions and deletions.

Dr. Murray Galt Motter, the Secretary of the Pharmacopœial Convention, discussed a number of the more important points embodied in the able, comprehensive and timely paper by Dr. Wiley and pointed out more particularly that the work and the function of the Executive Committee, as outlined by Dr. Wiley, was in accordance with the intent and purpose of the Board of Trustees of the former Convention.

He also pointed out that the professional representation on the General Committee of Revision was not alone interesting but rather significant. Of the total number 34 (indeed 35 when a vacancy was filled) were nominees of the pharmaceutical caucus and but 16 were nominees of the medical caucus. Of the latter it is also interesting to note that only 2 reached the executive committee.

In connection with the scope of the Pharmacopœia he pointed out that the Pharmacopœial Convention, by a vote of 95 to 47, emphatically recorded its conviction that substances "whose value and use have not been established" should not be included. And then, on the plea that it was unnecessary to hamper the Committee elected for the purpose of carefully selecting the list of substances, the Convention was induced to strike out, by a vote of 123 to 40, this "ambiguous and dangerous provision" thus leaving the final decision regarding scope with the members of the General Committee of Revision.

With reference to the business of the Pharmacopœial Convention he asserted that it had been pointed out by several observers that "the financial statement made to the Convention was in no wise satisfactory, explicit, or in justice to the intelligence of the body to which it was delivered." In commenting on "the enormous sales of the book amounting to nearly 40,000 copies the first year," he

pointed out that as a matter of fact the sales of the Pharmacopœia did not reach 40,000 until the middle of 1908.

In concluding he expressed the belief that if those who are to effect the work of revision do not clearly realize their responsibility to the Convention and to the several professions represented, and produce a book of standards indeed, but of standards for substances of established value and use, the next Pharmacopœia, instead of being a force, will be a farce.

Dr. Reid Hunt, Chairman of the American Medical Association Committee on the Pharmacopœia of the United States, pointed out that regarding the scope of the book there were two diametrically opposed views, both of which deserve consideration. The manufacturer and the pharmacist desire to have a book of standards that will include all of the substances that are, have been, or may be used as medicine, while the medical practitioner desires to have a book of standards for the approved therapeutic agents only so that the book may be used as a basis for instruction in medical schools and as a guide to the physician who is willing to adopt and use recognized standard remedies. It must be evident that these two objects are so totally different that it would be practically impossible to agree on a compromise and any attempt to do so would be considered a straddle that would be acceptable to but few.

He heartily endorsed the stand taken by Dr. Wiley regarding the scope of the book and expressed the belief that physicians and pharmacists should not be expected to furnish standards for Custom House officials and patent medicine manufacturers. As chairman of the Committee on the Pharmacopœia of the American Medical Association he had been able to get into communication with thousands of medical practitioners in various parts of the United States, all of whom were willing to use the best medicines that were available and desirous of obtaining authentic information regarding the probable efficiency of drugs.

Dr. Hunt outlined the methods that had been employed by his committee to secure the co-operation of the several sections of the American Medical Association, and referred more especially to the correspondence that had been had with medical men in active practice who were also teachers of materia medica and therapeutics in medical schools and colleges, and asserted that despite the fact that the evidence thus secured had been submitted through the Pharmacopœial Convention to the Committee of Revision, many of the members appeared to be willing to ignore the wishes of physicians and

the indications are that the scope of the forthcoming Pharmacopœia will again represent the views of but a limited number of individuals.

As an indication of the opinions held by the better informed medical men he quoted Dr. Abraham Jacobi, the Nestor of American physicians, who in discussing the content of the present Pharmacopœia deplored the fact that the makers of the Pharmacopœia were not willing to restrict the book to the best remedies only.

Dr. W. M. Barton seconded the remarks made by Dr. Hunt and asserted that he had also come to the conclusion that there are two diametrically opposed opinions regarding the scope of the Pharmacopœia and was satisfied that the book cannot, as it now stands, be accepted by medical men as a guide. He suggested the possibility of limiting the medical recognition of drugs by introducing a fair statement of the physiological action of the substance with each description.

Dr. Wiley, in closing the discussion, expressed himself satisfied with the feast of oratory that had been supplied to the members of the City of Washington Branch and their guests, and felt sure that nothing that he could add would tend to increase the appreciation of the importance of revising the Pharmacopœia of the United States along the lines laid down by the United States Pharmacopœial Convention.

M. I. WILBERT, Secretary.

REPORT OF THE CITY OF WASHINGTON BRANCH, COMMITTEE ON THE JOURNAL OF THE AMERICAN PHARMACEUTICAL ASSOCIATION.

Your Committee, appointed to consider the paper by Mr. Joseph W. England entitled *"The Journal of the American Pharmaceutical Association,"* greatly regrets to announce that, since its appointment at the October meeting of this Branch, the American Pharmaceutical Association has sustained a serious and irreparable loss in the death of Prof. C. S. N. Hallberg, the editor of the *Bulletin* and the chief Editor-elect of the proposed journal. This untimely death greatly complicates the problems involved in the launching of the new journal. While your committee was not specifically instructed to consider anything but the communication above referred to, it nevertheless feels that the occasion is an unusual one and that the late Editor's long years of disinterested service to pharmacy, and particularly the American Pharmaceutical Association, merit special recognition.

Your Committee would, therefore, respectfully recommend the adoption of the following preamble and resolutions:

WHEREAS, We, the members of the City of Washington Branch of the American Pharmaceutical Association, having learned of the death of C. S. N. Hallberg, a prominent member, and Editor of the Bulletin of our Association, are desirous of expressing our appreciation of his long continued and unselfish interest in everything pertaining to the advancement of the American Pharmaceutical Association and the progress of true pharmacy generally, now, therefore, be it

Resolved, That we hereby record our appreciation of his unfailing and untiring devotion to pharmacy, his singleness of purpose, and the unquestioned probity which guided his every effort in securing for true pharmacy the recognition properly due it.

Resolved, That a copy of these resolutions be embodied in our minutes and a copy forwarded to the family of the deceased as an expression of our sympathy and esteem.

The evidently authoritative communication, entitled "The Journal of the American Pharmaceutical Association," published in the October, 1910, number of the *Am. Ph. A. Bulletin* (p. 555), indicates that there are a number of important questions which appear, as yet, to have received insufficient consideration by the Committee therein referred to.

By far the most important of these several questions is the vacancy caused by the unexpected death of the newly elected Editor-in-chief. Professor C. S. N. Hallberg was generally conceded to be thoroughly well-fitted by his unusual training and experience to undertake the launching of this project, so fraught with possibilities for success or failure, for progress or retrogression, as the publication of a journal which will, inevitably, bring the Association into active competition with a number of drug and trade journals which have for decades been more or less influential in maintaining and developing the Association along the lines hitherto pursued.

That the position of Editor-in-chief and general manager of such a Journal is recognized as being the all-important factor, on which the success or failure of the enterprise must depend, is well indicated by the following opinion of a correspondent, himself well qualified by long years of experience to speak with authority:

"What the American Pharmaceutical Association needs is a man who has arrived, who understands every phase of journalism from the buying of paper and keeping tabs on the printer-man, all the way through soliciting "ads," preferred positions, writing top-heads and sub-heads, making up a page of reading matter in an artistic

manner, and so forth, all the way down to hiring and firing help and standing off the dissatisfied co-boss and the cantankerous advertiser or contributor. Such a man is rare and is *nascitur non fit,* and he has yet to go through a course of training to develop his technic at that."

The importance of this one question alone, the imperative need of securing for the prospective Journal an editor who is independent, efficient, fearless, and competent, would appear to your committee to be a sufficiently valid reason for deferring the publication of the new Journal from July 1, 1911, to January 1, 1912, so as to give the members of the Council of the Am.Ph.A. ample opportunity to canvass all of the several candidates, and to select from among them the one man most capable of meeting the requirements so tersely outlined above.

In addition to this self-evident reason for delaying the publication of the initial number of the proposed Journal, your committee would point out that there are a number of other reasons, any one of which should suffice to cause the Council of the Am.Ph.A. seriously to consider the advisability of deferring publication of the Journal until after the meeting of the American Pharmaceutical Association, in August, 1911. In order that this report may not exceed reasonable limits, but a few of these reasons may be mentioned and they but briefly:

For very practical reasons, it is advantageous to begin and end a volume of a periodical with the calendar year. The importance of this consideration is, perhaps, best appreciated by librarians and compilers, but even the casual reader must recognize the possibility of irritating mistakes and serious delays caused by incomplete references to articles in journals covering a portion of two calendar years.

The outline of the scope of the prospective Journal, as presented for the committee in the article referred to your committee, is altogether too general to be seriously considered by any association having the ideals and the aims of the American Pharmaceutical Association. The scope of the Journal, as thus outlined, would permit of a vacillating policy on the part of the editor or the committee on publication, both as to the reading matter and as to the kind and character of the advertising matter that is to be accepted.

In the opinion of your committee, the Council of the Association should also define the responsibility for material appearing in the reading pages of the Journal. We would suggest that it require

that all articles be signed, unless full and complete responsibility be assumed by the editor-in-chief. Such a policy would obviate possible misunderstandings and be a safeguard against anonymous communications.

Your committee would call attention to the proposed change in the size of the publication, as outlined in the paper under discussion. For upwards of fifty years the publications of the American Pharmaceutical Association have been in the widely used and convenient octavo form. The proposed change to quarto would necessitate rearrangement, and probably cause dissatisfaction in every library in which the publications of the Association are kept on file. Apart from the possible factor of economy, there is nothing whatever to recommend this proposed change.

Your committee would also beg leave to call attention to the fact that there appears to have been no provision made for publishing the report on the progress of pharmacy for the period between July 1, 1910, and June 30, 1911. We would recommend that this matter be published as a separate volume, in size uniform with the present bound volumes of the "Proceedings." We would recommend further that, for the period after July 1, 1911, this report be embodied in the Journal itself, so as to enhance the current value of the publication as much as possible.

Regarding the beginning of the publication on July 1, 1911, as heretofore decided upon, your committee would point out that the general scarcity of desirable original material in July would seriously militate against launching the Journal in the most presentable form at this time of the year, and would tend to hamper its influence by prejudicing both members of the Association and non-members at the very outset. On the other hand, we would point out that, in the event that the publication be deferred until after the annual meeting of the Association, the present Bulletin could be continued for all necessary announcements and news reports, and the initial numbers of the Journal be prepared in advance, so as to provide for the early publication of the original articles presented at the next annual meeting—even if it should be found necessary materially to enlarge the earliest numbers of the Journal, this would create a favorable impression.

To recapitulate, your committee heartily agrees with the sentiment that:

"In deciding to establish a Monthly Journal, the American Pharmaceutical Association has taken one of the most important

steps in its history, a step potential with large possibilities of good for American pharmacy."

It should be remembered, however, that in the event that this Journal should not prove to be all that its most ardent advocates expect it will be, but becomes an additional factor in hindering progress, instead of promoting the objects of the American Pharmaceutical Association, as paraphrased so tersely from the late Editor of the Bulletin, such a Journal might serve to stifle research, suppress knowledge, and discredit pharmaceutical education.

Your committee would, in conclusion, reiterate its original recommendation, that the Council of the American Pharmaceutical Association be importuned to defer publication of the Journal until opportunity shall have been afforded for the thorough discussion of these considerations.

In view of the urgent and far-reaching importance of this matter, your committee would recommend that the Secretary of the Branch be directed to forward copies of this report to the individual members of the Council of the American Pharmaceutical Association and to the pharmaceutical press.

Respectfully submitted,

(Signed) LEWIS FLEMER,
H. E. KALUSOWSKI,
S. L. HILTON,
M. I. WILBERT.

Dec. 10, 1910.

The above report was unanimously adopted at the meeting of the City of Washington Branch of the American Pharmaceutical Association, held on the evening of Saturday, December 10, 1910.

In accordance with the instructions contained therein, I am sending you this copy. Respectfully,

M. I. WILBERT,
Secretary.

Washington, D. C., Dec. 17, 1910.

NEW ESSENTIAL OILS.*

OIL OF XANTHOXYLUM ALATUM. From London we received under the name of "Chinese Wild Pepper" the fruit of *Xanthoxylum alatum* Roxb., a shrub belonging to the Rutaceæ, which occurs in the mountains of Northern Bengal as well as in China. Upon dis-

* From the Semi-Annual Report of Schimmel & Co. (Fritzsche Brothers), October, 1910.

tillation the fruit yielded 3.7 per cent. of a lemon-yellow oil with a peculiar odor, reminding of oil of water-fennel. Continued distillation yielded, in addition, 0.9 per cent. of a crystalline substance. We were compelled to abandon the attempt to dissolve this substance in the oil in the proportion indicated, because the bulk of the solid constituents again separated out even at a temperature of 25 to 30°. The properties of the oil and of the solid substance were therefore determined separately. The oil behaved as follows: $d_{15°}$ 0.8653, a_D — 23° 35′, $n_{D\ 20°}$ 1.48131, acid no. 9.9, ester no. 10.3, ester no. after acetyl. 33.6, soluble in 2.6 vol. and more of 90 per cent. alcohol. According to these analytical values the oil appears to consist chiefly of hydrocarbons, the nature of which remains to be elucidated by further investigation. The odor suggests the presence of phellandrene.

The solid substance which was obtained in the process of distillation, after being twice recrystallized from alcohol, presented colorless, odorless, optically inactive needles or leaflets, m. p. 83°. It was readily soluble in ether, chloroform, and acetone, a little less readily in alcohol, benzene, and light petroleum (all three of which solvents are very suitable for recrystallizing the body), and was insoluble in water. The substance is not an acid; it appears rather to be a phenol or lactone-like compound, as is evident from the fact that it does not react with solutions of alkaline carbonates, while it does react with those of caustic alkalies, from which latter it is again separated out by acidulation. Although when heated with benzoyl chloride it reacted violently, the yield of the resulting benzoyl compound was only slight, the greater part of the compound having remained intact. After repeated recrystallization from alcohol the benzoyl compound formed stout crystals, melting at 89°.

Dr. A. J. Ultée, of Salatiga, Java, has recently sent us a sample of an essential oil which we desire to describe here only briefly, as a detailed publication concerning its composition has been promised by Dr. Ultée himself.

Oil of Alpinia Galanga Willd. (Fam. Zingiberaceæ). This oil was of a lemon-yellow color and possessed a peculiar, strongly aromatic odor. Its constants were as follows: $d_{15°}$ 0.9847, a_D + 4° 20′, $n_{D\ 20°}$ 1.51638, acid no. 1.8, ester no. 145.6, soluble in its own vol. of 80 per cent. alcohol, opalescence ensuing upon the addition of 3 vols. According to Dr. Ultée, the oil contains pinene, cineol, camphor, and methyl cinnamate. The ester number of the oil indicates the presence of 42 per cent. methyl cinnamate.

FRONT VIEW OF THE PHARMACEUTICAL INSTITUTE OF THE UNIVERSITY OF BERLIN, WITH BOTANICAL GARDEN, FACING KÖNIGIN-LUISE-STRASSE IN STEGLITZ-DAHLEM, NEAR BERLIN.